

SYNTAX

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PERSONAL COMPUTERS

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TIMEX PRINTERS ON THEIR WAY

Timex printers are en route to distributors, according to a Timex source, and should be in retail stores in March. TS2040 printers offer 32-column thermal printout and require no interfacing. Price: \$99.95.

KOPAK INTRODUCES NEW KEYBOARD

Kopak Creations' new keyboard, ready in 15 weeks, plugs into internal ZX/TS keyboard connector. Full-size keyboard features on/off switch, standard space bar and RETURN, 2 ENTER and 2 shift keys, shift lock and 4 single-stroke keys (comma, colon, \$, DELETE). Optional numeric keypad extra (price not set). Preproduction orders \$69.95+\$5.50 P&H. Full price is \$99.95+\$5.50 P&H. Kopak Creations, 119 Peter St., Union, NJ 201/864-4410.

DRIVE TO RUN CP/M IN THE WORKS

Kopak Creations and Aerco are working jointly on a ZX/TS disk drive to run CP/M (world's most common disk-based microcomputer operating system.) Aerco says the drive will be available in 3 months. Now work continues on the software and getting a license from Digital Research, CP/M's originator. Aerco's spokesperson would not predict the drive's price. Aerco, Box 18093, Austin, TX 78760-8093, 512/ 385-7405.

WANTED: ASSEMBLY LANGUAGE PROGRAMMERS

Proprietary International needs assembly language programmers for their unreleased ZT21000 (Jan. 83). You'll get a production-model unit, documentation and a marketing contract, but you'll pay \$1000, says Steve Zwaska of PI. Send a short resume (with phone number) and sample program (plus check) by 3/21/83. Info: Randy Wear, 800/356-8392, PI, 131 LaSalle Rd., Streamwood, IL 60103.

NEW PRODUCTS AND SERVICES

New ZX/TS software: Blackjack and Hi-Lo (tape 1); Mastermind, Supermind and Guess (tape 2); Escape, Snake and The Trap (tape 4). Each tape, \$10.95. Compuwiz Software, POB 390078, Mt. View, CA 94039.

Plug-in speech module, The Parrot, makes 64 English-language sounds. Combine sounds (allophones) to generate words, phrases, sentences and sound effects. Package includes: software, directions, jack for 4- or 8-Ohm speaker. Power socket permits more power. R.I.S.T. Inc., \$69.95, 921 Port Washington Blvd., Port Washington, NY 11050, 516/883-8865. In Canada: Integrated Data Systems, 11 Brighton Ave., Toronto, Ontario, Canada M4M 1PW.

Guide to ZX Spectrum Resources, a 92-page illustrated book, details, reviews British products for the new Spectrum/TS2000. \$6.50, Microscene, 6 Battenhall Road, Harborn, Birmingham B17 9UD, UK.

SCREEN-CALC, ZX/TS electronic spreadsheet program, holds 450 user-defined entries as either input data or calculated results. You can define any entry in terms of other entries. Built-in features total and average columns and rows and can locate entries by name. On cassette. Banta Software, 8088 Highwood Way, Orangevale, CA 95662, 916/722-4895.

Hidden Words, ZX/TS word search game, conceals words in the playing grid. Word editor lets you change words; four levels of play. On tape, 16K required, \$9.95. Software Unlimited, P.O. Box 147, Grandview, MO 64030.

Construct current buffer for tape recorder remote jacks. Excessive current can damage the relays in your ZX99. Schematic package allows you to construct buffer to

reduce remote jack current to 10 mA. ZX99 can't tolerate more than 130 mA. Schematic package and information on constructing current buffer for input/output recorder jacks using simple parts. Z-WEST, P.O. Box 2411, Vista, CA 92083.

KBD-1 keyboard for TS1000 has 58 plunger-type keys, 12 spare keys, internal or external PC board installation without solder, full space bar, dual shift keys with shift lock, electronic shift/unshift, repeat and fast repeat on all keys, keyboard entry disable and instruction manual. \$84.95 plus \$4.95 P&H. Half-size 5 1/4" disk drive is in the works. SYNERGISTIC, P.O. Box 411023, Chicago, IL 60641, 312/772-7461.

Machine code debugger for BASIC programs resides in the top 2.5K of 16K. STEP can single-step BASIC lines and be set to RUN to conditional breakpoints or break after a specified number of loops. \$14.95 plus \$2 P&H. HOT Z, machine code monitor and disassembler, is now available on four 2716 EPROMs addressed to 8-16K memory block. Chips require Hunter memory board or home-made EPROM reader for access to HOT Z monitor. Four tested 2716s, \$40. Sinware, Box 8032, Santa Fe, NM 87504.

Problem Solver, an external voltage regulator, eliminates loading and overheating problems and includes on/off switch. Schematic, parts list, assembly directions, \$12.95; kit, \$24.95; wired and tested \$49.95. Original Programs, 3763 W. Crocus Dr., Phoenix, AZ 85023.

User-friendly 16K Ohm's Law program. On cassette, \$15 plus \$1 P&H. Keyboard conversion plans for ZX80/ZX81, TS1000 includes decoding shift keys and reset, \$5 plus \$1 P&H. Arizona residents add 6% sales tax. Spectra Computer Products, P.O. Box 41795, Tucson, AZ 85717.

VENDOR REPORT

In this new department, you'll find out about ZX/TS vendors--what problems exist and which have been resolved, who's in business and who's not. If you're having problems with a vendor, let us know. We'll help find a solution.--Ed.

OUT OF BUSINESS: Synchronize, Box 1667, Kerrville, TX 78028, advertised in Winter 82 SQ. If you have a problem with them, call SYNTAX.

ZXPress Compiler from Non-Trivial Solutions is now available only from Proprietary International. They should fill all back orders and inquiries before press time. If you have a problem, contact Randy Wear, Marketing Director, 800/356-8392. PI, 131 LaSalle Rd., Streamwood, IL 60103.

We've heard complaints about Norris Radio and Electronics' repair and return practices. We telegraphed Tracy Norris about these problems (no phone listed), but he has not responded. Norris is a ZX/TS repair shop in Slidell, LA.

Neither have we heard from SMUG, the Sinclair Midwest Users' Group in Fort Wayne, IN. Some readers wrote they did not receive software they ordered from SMUG. Last month we wrote to SMUG to inquire; we'll let you know if they answer.

Gladstone Electronics is working on catching up on their US shipments. Readers have reported receiving cancelled checks promptly, but no merchandise up to two months later. Howard Gladstone says US shipments are now about 4 weeks behind, with Canadian shipments on schedule. They increased their staff and shifts to remedy the problem. You can now talk to Gladstone until 1 AM EST. Ask for head troubleshooter Pauline Sampson in Buffalo, NY, at 716/874-5510.

USERS' GROUPS

Bakersfield, CA: Bakersfield Timex/Sinclair Users' Group, Don Stewart, 2617 Anza St., Bakersfield, CA 93305, 805/871-7024.

Detroit, MI: Sig-Sinclair c/o SEMCO, Don Bicht, P.O. Box 02426, Detroit, MI 48202, 313/535-6253.

Fredericton, NB, Canada: Fredericton Sinclair/Timex Users' Group, John Palmer, Fredericton, NB, Canada, 506/454-0705.

Huntsville, AL: Sinclair Users' Group, Bob Boyle, 7705 Martha Drive, Huntsville, AL 35802, 205/883-4354.

Manitoba, Canada: The Manitoba Telephone Systems Sinclair ZX81 Systems Users' Group, Ben Landry, 204/888-4516.

Modesto, CA: Time-Sync Group for Central Valley California, Thomas Eckle, 3716 Corte Madera St., Modesto, CA 95350.

Palatine, IL: The Sinclair Users' Network (SUN), nationwide users group. Diana Wright, 2170 Oak Brook Circle, Palatine, IL 60067, 312/934-9375.

Portland, OR: Portland Area Timex/Sinclair Users' Group, Michael Veine, P.O. Box 3153, Portland, OR 97208, 503/774-9637.

Redwood City, CA: ZX Micro Club, c/o Ampex Corp., Don Femling, 401 Broadway M.S. 2-04, Redwood City, CA, 415/367-3454.

PROGRAM IMPROVEMENTS/REFINEMENTS

To get a heart without a bite taken out of it in Sweetheart (Feb.83) change line 120 to: FOR B=7 TO 24. New Syntactic Sum is 22457.

John Sampson, College Point, NY

CHANGE YOUR
TIMEX/SINCLAIR 1000 DISPLAY
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LOOK AT THE FEATURES !!!

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for \$149.95

Use your KOLORWORKS immediately with a game cassette for \$9.95

This delightful game is designed for hours of fun using some of the color graphic capabilities of KOLORWORKS. The cassette also contains a short program to familiarize you with some of the commands and graphics.

MAIL TO:

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P.O. Box 506
Pewaukee, WI 53072

	Price +	Qty.	Amount
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CASSETTE	9.95		
Shipping and Handling	4.95		\$4.95
Wi. Res. add Sales Tax			
My <input type="checkbox"/> check <input type="checkbox"/> money order enclosed			TOTAL

Name _____

Street _____

City _____ State _____ Zip _____

Please allow six to eight weeks for processing. Thank you.

For further information - Send \$2.00 (credited to order)

WATCH FOR:

"GAAMWORKS" -

Joystick Ports / Sound / Cartridge Slot

A SOJOURN AT COMPUSERVE

Compuserve Information Service is available to ZX/TS owners with a modem and the proper software. (Modems allow two or more computers to communicate via phone. SYNTAX Jan.83 describes one available ZX/TS modem.) For \$5/hr. (initial \$100 subscription fee), you get: electronic mail, newspapers and magazines, banking, games, SIGs (Special Interests Groups), and a special programmer's area. You can also store programs, up to 64K, at no extra charge!

To access the system, you need a user number and password which you get from computer stores or Compuserve (800/848-8990; in Ohio call 614/457-8650). They also explain log-on procedures and how to hook up to the system.

Compuserve uses prompts throughout. Because the menu is slow, I prefer GO statements. For example, if I tire of playing Wumpus, and want to call the Work-at-Home SIG, I enter GO HOM-146 at the prompt. Compuserve's computer then looks up the particular disk file and lets me access it.

This system supports many varied SIGs. One or more SYSTEM OPERATORS run each SIG. SYSOPs manage the SIG, moderate the SIG C.B. simulator, keep SIG database files neat and help newcomers.

SIGs cover the entire world of computing in the Personal Computer Service area. That is, except for ZX/TS computers. But there's hope. I talked, via computer, with SYSOPs on Computer and Electronics magazine SIG. They welcome a ZX/TS SIG in their group (GO CEM-450) and have a database available for ZX/TS computer users.

Patrick Spera, Tinker AFB, OK

For more information, contact Compuserve Corporate Headquarters, 5000 Arlington Centre Blvd, Columbus, OH 43220.--Ed

THE POWER.



AND THE GLORY.



TIMEX has given the world a breakthrough in personal computing power at an affordable price. Now, to the power of the TS-1000, you can add the glory of MEMOTECH . . . of "piggy-back" compatibility: increased memory, a user-oriented keyboard, a printer interface, a full spectrum of printers, high resolution graphics and a remarkable range of new applications.

In short, MEMOTECH offers you the high-quality peripherals that turn an introduction to computing into a versatile, full-powered computer system.

New from Memotech . . . the TS-1000 keyboard . . . and state-of-the-art printers.

Keyboard. The Memotech keyboard is a standard (Typewriter) keyboard with TS-1000 legends. The keyboard is cable-connected to a buffered interface which is housed in a Memopak case, and plugs directly into the back of the computer or other Memopaks.

Printers. Memotech offers you a wide range of high quality printers . . . including the SEIKOSHA GP 100A. The Seikosha GP 100A uses a 5 x 7 dot matrix printing format with ASCII standard upper and lower case character set. Printing speed is 30 characters/second with a maximum width of 80 characters. The printer uses standard fanfold paper up to 9 1/2" wide. The GP 100A is offered as a package including cable and interface.

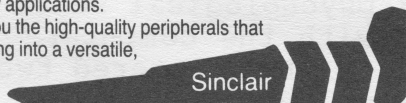


Other printer packages are also available through Memotech.

Memopak 16K RAM. The Memopak 16K RAM offers expansion capabilities through its "piggy-back" connection and is fully compatible with Timex or Memotech 16Ks to give a massive 32K of RAM.

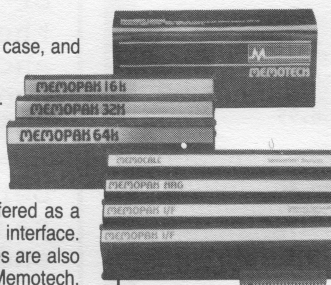
Memopak 32K RAM. Offers your TS-1000 a full 32K of directly addressable RAM. It enables you to execute sophisticated programs and store large data bases. It is also fully compatible with the Timex or Memotech 16K RAMs to give you a full 48K of RAM.

Memopak 64K RAM. Turns your TS-1000 into a powerful computer suitable for business, recreational and educational use. No additional power supply is required. It accepts such basic commands as 10 DIM A (9000).



Printer Interface
High Resolution Graphics
Memopak RAM

Peripherals that fit like a glove . . . for an integrated system look.



New Memocalc . . . push-button spreadsheet analysis. Allows the generation of a spreadsheet of up to 7000 numbers with up to 250 rows or 99 columns. Every time the command to calculate is given, all the numbers in the table are instantly re-evaluated.

Memopak HRG. The Memopak High Resolution Graphics, with up to 192 by 248 pixel resolution, enables display of high resolution "arcade game" style graphics through its resident 2K EPROM, programmed with a full range of graphics subroutines.

Memopak Interfaces. The Memotech Centronics parallel or RS232 interface paks enable your TS-1000 to use a wide range of compatible printers. The resident software in the units gives the ASCII set of characters. Both Memopak printer interfaces provide lower case character capabilities and up to 8 column printing. The RS232 Interface is also compatible with modems and terminals.

Order at no risk! If you're not completely satisfied, return any Memotech product within ten days for a full refund. And Memotech's **six month warranty** means we'll repair or replace any defective part free.

To order, use the order coupon or call our toll-free number **800/662-0949**. Dealer inquiries welcome.

Mail to: Memotech Corporation
7550 West Yale Avenue
Denver, CO 80227

	Price*	Qty	Total
16K RAM Baseline	\$ 49.95		
16K RAM	59.95		
32K RAM	109.95		
64K RAM	179.95		
Memocalc	49.95		
Keyboard with Interface	99.95		
High Resolution Graphics	124.95		
Centronics Parallel Interface	104.95		
RS232 Interface	139.95		
Printer Cable	19.95		
GP 100A Printer Package**	399.00		
Shipping and Handling	4.95		\$4.95
Tax (Colorado residents only)			
TOTAL	\$		\$

*All prices quoted in U.S. dollars. Prices and specifications subject to change without notice.
**Please add an additional \$5.00 for printer shipping charges.

Check MasterCard Visa

Account No. _____ Exp. _____
Name _____
City _____ State _____ Zip _____
Phone _____

Code: STX-03

MEMOTECH
CORPORATION

7550 West Yale Avenue • Denver, Colorado 80227
(303) 986-1516 TWX 910-320-2917

HARDWARE REVIEW

Product: E-Z Key 60 Keyboard
From: E-Z Key
Suite 75A
711 Southern Artery,
Quincy, MA 02169
617/773-1187
Price: \$84.95 plus \$4 P&H

E-Z Key offers a 60-key keyboard in a 10" x 4" x 1/2" black case that matches your ZX/TS. Each gray key is slightly concave, has a definite stroke and an audible click. Keys include the ZX/TS's standard 40 plus a numeric keypad, a second shift key, a 4 3/4" space bar and eight single stroke (no shifting) keys. The single stroke keys are FUNCTION, EDIT, DELETE, STOP, single quote, double quote, colon and semi-colon. Keyboard screening matches the ZX/TS legends. Shift keys are red and match the red screening of the graphics and shifted characters. The func-

tion key and function legends are yellow. Keywords, numbers and letters are white.

To install E-Z Key keyboard you must take apart your ZX/TS case, but no wiring is necessary. Gently remove your ZX/TS keyboard cables and replace them with the copper laminated cable that comes with the keyboard package.

E-Z Key's keyboard cable snaps easily in place and appears quite durable. It was the first time I had taken my ZX/TS apart and installation took me five minutes. My new keyboard worked perfectly as soon as I turned my ZX81 on.

I really like the audible click of the E-Z Key 60. I find the single stroke DELETE, EDIT, FUNCTION and large ENTER keys very useful. I also use the numeric keypad and single stroke quote and semi-colon regularly. I found the keyboard easy to read and my entry time improved significantly. E-Z Key 60 Keyboard gave me a stronger psychological sense of "working with the computer."

I encountered two problems with my keyboard. First, OR and STEP legends were missing from the keyboard screening. Second, the back of the keyboard rocked slightly on the cable plug--not enough clearance under the keyboard. A telephone call to E-Z Key revealed that both problems were being fixed. They volunteered to fix my keyboard before I could ask. E-Z Key also said they plan to make bolder legends for punctuation marks and an improved instruction sheet.

I am pleased with my E-Z Key 60 keyboard. It is well designed, comfortable to use, is completely consistent with the style of my ZX/TS computer and improves entry. It's an excellent addition to your ZX/TS system that will help you to take advantage of all your computer's capabilities. I highly recommend E-Z Key 60.

Robert Masters, Tewksbury, MA

TIMEX 1000 \$59.95*

BUSINESS

Budgeting	\$8.95
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Graph	\$9.95

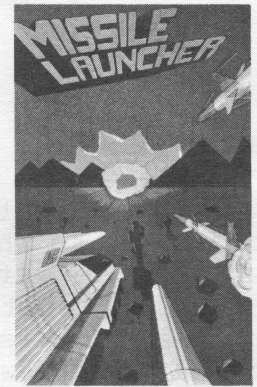
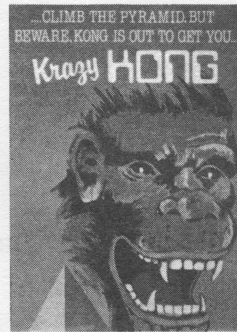
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- 32K RAM # PL7003 \$109.95
- 64K RAM # PL7004 \$179.95
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- CENTRONICS PARALLEL INTERFACE # PL7005 \$104.95
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- SEIKOSHA GP-100A PRINTER The revolutionary low-cost dot matrix impact printer—Uses up to 9.5" paper # PL7008 \$349.00
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- PRINTER-INTERFACE CABLE # PL7010 \$19.95
- MEMOCALC Software on plug-in EPROM cartridge—Spread sheet analysis—Up to 7000 numbers (when used with 64K) # BS200C \$59.95

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All programs use 16K RAM.

NEW products coming soon: Software on ROM/EPROM CARTRIDGES—SOFTBOX™. A software library which can contain several ROM/EPROM programs. Plug in your computer and instantly call any program from your SOFTBOX™. A full line of software and peripherals for the colorful ZX SPECTRUM/TIMEX SINCLAIR 2000.

For more information, Free Brochure, and Special Package Discount, write or call: IC INTERCOMPUTER INC. P.O. Box 90, Prudential Center Boston, MA 02199 Tel: (617) 437-1190 Telex: 951141 COFAR



QSAVE A Hardware-Software Combination— Allows a baud rate of 4000 to be achieved compared with only 250 on the normal SINCLAIR ZX81—Loads and saves a full 16K in only 29 seconds—Works with 16K and 64K. # PL7001 \$37.95



Dealers and Distributors Inquiries Welcome

Mail to: Intercomputer, Inc., P.O. Box 90, Prudential Center, Boston, MA 02199

PART #	QTY.	UNIT U.S. \$	TOTAL
Shipping and Handling Printer		9.95	
Shipping and Handling Memotech Products and QSAVE		4.95	
Mass. Residents Tax		5%	
		Total	

Check Mastercard Visa

Account No. _____ Exp. _____

Name _____

Address _____

City _____ State _____ Zip _____

HOME MANAGEMENT

- **BILL ORGANIZER** Keeps track of bills, amounts due, date due, finance charges, payments made, etc. Summarizes all data for tax purposes. # HM5001 \$14.95
- **CHECK BOOK** Balances and maintains your checkbook. Finds all checks written to one payee easily. Add a printer and it will even write checks for you. # HM5002 \$14.95
- **ADDRESS BOOK** Store, update and retrieve names, addresses, and phone numbers. With a printer attached, it will print mailing labels, sorts entries alphabetically by name, or by Zip Code. Only remember part of a name? It will find records from incomplete information. Code the entries for special purposes, i.e. Christmas Cards, Party Invitations, etc. # HM5003 \$14.95
- **OCCASION CALENDAR** Keep track of birthdays, anniversaries, meetings and special events. Have your calendar appear on the screen at the touch of a key. # HM5004 \$14.95

All programs use 16K RAM.

ENTERTAINMENT

- **MISSILE LAUNCHER** Challenge the enemy by destroying his ammunition stored in different locations. # FG1002 \$12.95
- **KRAZY KONG** A new version of the popular arcade game. This program has all the features of the original and is every bit as fast. # FG1013 \$12.95
- **GHOST HUNT** Gobble your way through a maze of Ghosts, Power Pills, etc., etc., very fast. # FG1014 \$12.95
- **MAZE DRAG RACE** Drive through a giant maze 9 times the size of the screen, watch out for other cars, rocks, oil and ice. A really superb machine code game. # FG1015 \$12.95
- **DEMOLISHER** Design an intelligent strategy to demolish a growing wall before it crushes you. # FG1005 \$12.95
- **MCODER** Compiles a BASIC program into machine code—Extremely simple to use—Write and debug your Basic programs—Enter the MCODER—the Basic program will be compiled into machine code as you watch. # PT4001 \$18.95
- **RETURN FROM SPACE** # FG1001 \$12.95
- **JEOPARDY** # FG1003 \$12.95
- **VEGAS** # FG1004 \$12.95
- **AIR ATTACK** # FG1006 \$12.95
- **GUARD THE PRESIDENT** # FG1007 \$12.95
- **SUBMARINE** # FG1011 \$12.95
- **COMBO PACK I** Contains Return From Space and Missile Launcher # FG1008 \$18.95
- **COMBO PACK II** Contains Vegas and Jeopardy # FG1009 \$18.95
- **COMBO PACK III** Contains Demolisher and Air Attack # FG1010 \$18.95
- **COMBO PACK IV** Contains Guard The President and Submarine # FG1012 \$18.95

All programs use 16K RAM.

Limited warranty—Defective Software will be replaced if returned within 30 days.—Memotech Products: 180 days—Seikosha Printer: 90 days

MATH--8K/16K

Use Math to introduce your children to the ZX/TS and give them experience with basic skills of addition, subtraction, multiplication and division. Math provides 4 skill levels with 10 problems in a set. Students get 3 tries on each problem before getting an answer.

Use the mix-up choice to choose randomly among the 4 operations. Division is protected from remainders, and subtraction never yields a negative answer.

Enter the listing in FAST mode, then switch your ZX/TS to SLOW and SAVE by typing RUN 100. Math self-starts and contains input prompts.

Inverse graphics are:

- 650 six graphic shift D
 - 1120 graphic shift space
 - 1130 graphic shift H
 - 1140 graphic shift space
 - 1150 graphic shift H
 - 1240 graphic shift H, A, H, A
- between words graphic shift H
then repeat beginning sequence.

Barry Boyer, West York, PA

```

10 REM *****
20 REM * MATH PRACTICE *
30 REM * BY B.L. BOYER *
40 REM *****
50 REM
60 LET I=INT (D/E)
70 LET D=I#E
80 LET D#=STR$ D
90 RETURN
100 SAVE "MATH"
110 PRINT AT 10,0;"PLEASE TELL
ME YOUR NAME"
120 DIM G$(10)
130 INPUT G$
140 DIM B$(5,14)
150 LET B$(1)="ADDITION"
160 LET B$(2)="SUBTRACTION"
170 LET B$(3)="MULTIPLICATION"
180 LET B$(4)="DIVISION"
190 LET B$(5)="MIX-UP"
200 LET GUESS=0
210 LET R=0
220 LET W=0
230 RAND
240 CLS
250 PRINT "THANK YOU,";G$;AT 1
,1;"NOW, PLEASE SELECT";AT 2,1;"
1. (+) ";B$(1);AT 3,1;"2. (-) ";
B$(2);AT 4,1;"3. (X) ";B$(3);AT
5,1;"4. (/) ";B$(4);AT 6,1;"5. (
?) ";B$(5)
260 IF INKEY#<>" THEN GOTO 260
270 IF INKEY#="" THEN GOTO 270
280 LET A#=INKEY#

```

```

290 REM *CHECK FOR VALID ENTRY
300 IF CODE A#<29 OR CODE A#>33
THEN GOTO 260
310 LET SL=VAL A#
320 LET A=SL
330 PRINT AT 8,0;"YOU PICKED ";
A;" ";B$(A)
340 PRINT AT 10,0;"NOW PICK DIF
FICULTY";AT 11,0;"LEVEL 1 TO 4"
350 IF INKEY#<>" THEN GOTO 350
360 IF INKEY#="" THEN GOTO 360
370 LET C#=INKEY#
380 IF CODE C#<29 OR CODE C#>32
THEN GOTO 380
390 LET C=VAL C#
400 FOR K=1 TO 10
410 FAST
420 IF SL=5 THEN LET A=INT (RAND
*4)+1
430 CLS
440 PRINT AT 1,1;B$(A);TAB 17;"
LEVEL ";C;AT 6,10;"PROBLEM ";K
450 DIM D$(C)
460 DIM E$(C)
470 IF C>1 AND A>=3 THEN DIM E$
(C-1)
480 IF C>2 AND A=4 THEN DIM E$(
C-2)
490 LET D#=STR$ (INT (RAND*9999)
+0)
500 LET E#=STR$ (INT (RAND*9999)
+0)
510 LET D=VAL D#
520 LET E=VAL E#
530 IF D>E THEN GOTO 600
540 LET T#=E#
550 LET TEMP=E
560 LET E=D
570 LET E#=D#
580 LET D=TEMP
590 LET D#=T#
600 IF (INT (D/E)<>D/E) AND A=4
THEN GOSUB 60
610 LET T=LEN STR$ D
620 LET S=LEN STR$ E
630 SLOW
640 IF A<4 THEN PRINT AT 10,10-
T;D#;TAB 10-S;E#;AT 12,5;"-----"
;AT 13,0;"
650 IF A=4 THEN PRINT AT 14,5;"
";AT 15,5-S;E#;AT 15,5;"")
660 IF A=1 THEN PRINT AT 11,4;"
+"
670 IF A=2 THEN PRINT AT 11,4;"
-"
680 IF A=3 THEN PRINT AT 11,4;"
X"
690 PRINT AT 21,0;"ENTER YOUR A
NSWER, PLEASE"
700 INPUT ANS
710 IF A=1 THEN LET CORANS=D+E
720 IF A=2 THEN LET CORANS=D-E
730 IF A=3 THEN LET CORANS=D#E
740 IF A=4 THEN LET CORANS=D/E
750 PRINT AT 20,0;"
";
AT 21,0;"
760 IF CORANS=ANS THEN GOSUB 90
0
770 IF CORANS<>ANS THEN GOTO 10
40
780 NEXT K
790 CLS
800 PRINT AT 1,1;B$(SL);TAB 17;"
LEVEL ";C
810 PRINT AT 9,1;G$;AT 10,1;"
";AT 12,1;R;" RIGHT AND ";W
;" WRONG"

```



```

820 FOR I=1 TO 30
830 NEXT I
840 PRINT AT 10,1;"WOULD YOU";A
T 12,1;"LIKE TO TRY ANOTHER GAME";
";AT 21,1;"ENTER (Y)ES OR (N)O"
850 IF INKEY#<>" " THEN GOTO 850
860 IF INKEY#="" THEN GOTO 860
870 LET A#=INKEY#
880 IF CODE A#=#62 THEN GOTO 200
890 STOP
900 REM *RECOG. CORRECT ANSWER
910 LET R=R+1
920 LET F#=STR# CORANS
930 LET U=LEN F#
940 LET GUESS=0
950 FOR J=1 TO U
960 PRINT AT 10,20;"YOU ARE";AT
11,20;"CORRECT"
970 IF A<>4 THEN PRINT AT 13,10
-J;F#(U-J+1)
980 IF A=4 THEN PRINT AT 13,6+T
-J;F#(U-J+1)
990 PRINT AT 10,20;"YOU ARE";AT
11,20;"CORRECT"
1000 NEXT J
1010 FOR I=1 TO 15
1020 NEXT I
1030 RETURN
1040 REM *INFORM OF WRONG ANSWER
1050 LET F#=STR# CORANS
1060 LET U=LEN F#
1070 IF GUESS=2 THEN GOTO 1260
1080 FOR J=1 TO U
1090 PRINT AT 10,20;"YOU ARE";AT
11,20;"WRONG"
1100 FOR I=1 TO 4
1110 NEXT I
1120 IF GUESS=0 AND A<>4 THEN PR
INT AT 13,10-J;" "
1130 IF GUESS<>0 AND A<>4 THEN P
RINT AT 13,10-J;" "
1140 IF GUESS=0 AND A=4 THEN PRI
NT AT 13,6+T-J;" "
1150 IF GUESS<>0 AND A=4 THEN PR
INT AT 13,6+T-J;" "
1160 PRINT AT 10,20;"YOU ARE";AT
11,20;"WRONG"
1170 NEXT J
1180 FOR I=1 TO 5
1190 NEXT I
1200 LET GUESS=GUESS+1
1210 PRINT AT 10,20;" "
";AT
11,20;" "
1220 PRINT AT 13,20;"YOU HAVE";A
T 14,20;3-GUESS;" CHANCES"
1230 IF GUESS=2 THEN PRINT AT 14
,20;" ";AT 17,20;G#;AT 18,20;"TH
INK HARDER"
1240 PRINT AT 21,0;"PLEASE P
RESS AGAIN"
1250 GOTO 700
1260 LET U=U+1
1270 PRINT AT 13,20;" "
";A
T 14,20;" "
1280 FOR J=1 TO U
1290 PRINT AT 10,20;"THE CORRECT";
";AT 11,20;"ANSWER"
1300 IF A<>4 THEN PRINT AT 13,10
-J;F#(U-J+1)
1310 IF A=4 THEN PRINT AT 13,6+T
-J;F#(U-J+1)
1320 PRINT AT 10,20;"THE CORRECT
";AT 11,20;"ANSWER"
1330 NEXT J
1340 FOR I=1 TO 10
1350 NEXT I
1360 LET GUESS=0
1370 GOTO 700
SYNTACTIC SUM: 53897, 8K ROM

```

WHERE TO MOVE RAMTOP?

Many programs that put machine code routines above RAMTOP tell you to lower RAMTOP first. This program calculates just what decimal numbers to POKE to put RAMTOP where you want it.

Enter the program as listed. Press RUN, then follow the prompts.

Richard Graffius, N. Versailles, PA

RAMTOP is a system variable that tells you where the computer thinks the top of memory is. You can change it to protect machine code (see SQ, Winter 82 p.20) or to reduce the available RAM. To calculate where to move RAMTOP, first figure out the standard RAMTOP for your memory size. Add the number of K of RAM you have to 16 (the ROM uses 16K bytes--8K of instructions and an 8K duplicate) and multiply by 1024 (bytes per K). Subtract the number of bytes to reserve. Enter the answer as the address line 100 asks for. This program also gives you the most and least significant (MSB and LSB) bytes of the address you enter.--Ed.

```

100 PRINT "ENTER ADDRESS OF RAM
TOP WANTED"
110 INPUT MC
120 CLS
130 DIM H(4)
140 PRINT
150 LET H(4)=INT (MC/4096)
160 LET H(3)=INT ((MC-H(4)*4096
)/256)
170 LET H(2)=INT (MC-((H(4)*409
6)+(H(3)*256))/16)
180 LET H(1)=MC-((H(4)*4096)+(H
(3)*256)+(H(2)*16))
190 PRINT MC;"= LSB..";H(2)*16+
H(1);" "; "MSB..";H(4)*16+H(3)
200 PRINT
210 PRINT
220 PRINT "FOR A NEW RAMTOP OF
";MC
230 PRINT
240 PRINT "POKE 16388,";H(2)*16
+H(1)
250 PRINT "POKE 16389,";H(4)*16
+H(3)
260 PRINT
270 PRINT
280 PRINT "THEN TYPE ""NEW"" AN
D ""ENTER"""
290 PRINT AT 19,0;"TO FIND ANOT
HER, TYPE ""RUN"""
SYNTACTIC SUM: 32243, 8K ROM

```

PLEDGE KEEPER--8K

Pledge Keeper simplifies recording pledges and can be especially helpful during telethons or other fund raising events.

It uses ID numbers instead of names, which are usually considered privileged information. Your data entry person doesn't need to know contributor's names and addresses but you can keep track of them for your pledge committee to use.

Enter the listing and RUN. Pledge Keeper asks for ID number, pledge amount, and kind of pledge (W for weekly, M for monthly, Q for quarterly, S for semi-annual or Y for yearly).

If you enter zero for a pledge, the program displays the ID number, and yearly amount of zero. Totals or averages won't use the entry.

After your last entry, enter a negative ID number and ENTER. Pledge Keeper displays and totals all pledges, the number of people

who pledged, and gives the average annual pledge.

Edit lines 10, 30 and 40 to suit your particular needs or insert your organization's name.

Robert DeMunbrun, Rushville, IN

```

1 REM KEEPING TRACK OF PLEDGE
$
2 REM BY R.M. DEMUNBRUN
3 REM INPUT ID NO., PLEDGE, KIND
D (W FOR WEEKLY-M FOR MONTHLY-Q F
OR QUARTERLY-S FOR SEMI-ANNUAL-Y
FOR YEARLY.
4 REM TO GET TOTALS AND AVERA
GES INPUT NEGATIVE NUMBER FOR ID

10 PRINT TAB 10;"FIRST UNITED"
20 PRINT TAB 12;"CHURCH"
30 PRINT TAB 9;"PLEDGES FOR"
40 PRINT TAB 13;"1983"
42 PRINT
45 PRINT "ID";TAB 5;"PLEDGE";T
AB 14;"KIND";TAB 20;"YEARLY"
50 LET N=0
60 LET T=0
70 INPUT I
80 IF I<0 THEN GOTO 840
90 INPUT P
100 IF P=0 THEN GOTO 550
110 LET N=N+1
120 INPUT A$
130 IF A$="W" THEN GOTO 600
140 IF A$="M" THEN GOTO 650
150 IF A$="Q" THEN GOTO 700
160 IF A$="S" THEN GOTO 750
170 IF A$="Y" THEN GOTO 800
550 PRINT I;TAB 20;P
560 GOTO 70
600 LET A=52*P
610 PRINT I;TAB 5;P;TAB 14;A$;T
AB 20;A
620 LET T=T+A
630 GOTO 70
650 LET A=12*P
660 PRINT I;TAB 5;P;TAB 14;A$;T
AB 20;A
670 LET T=T+A
680 GOTO 70
700 LET A=4*P
710 PRINT I;TAB 5;P;TAB 14;A$;T
AB 20;A
720 LET T=T+A
730 GOTO 70
750 LET A=2*P
760 PRINT I;TAB 5;P;TAB 14;A$;T
AB 20;A
770 LET T=T+A
780 GOTO 70
800 LET A=1*P
810 PRINT I;TAB 5;P;TAB 14;A$;T
AB 20;A
820 LET T=T+A
830 GOTO 70
840 PRINT
850 PRINT "NO. PLEDGES";TAB 13;
N
860 PRINT "TOT PLEDGES";TAB 12;
"$";TAB 13;T
870 LET V=(INT ((T/N)*100))/100
880 PRINT "AV PLEDGE";TAB 12;"$
";TAB 13;V
890 STOP
SYNTACTIC SUM: 4394, 8K ROM

```

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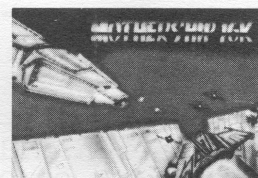
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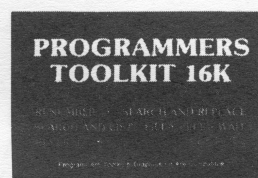
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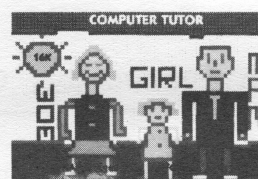
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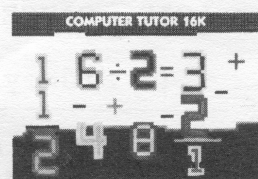
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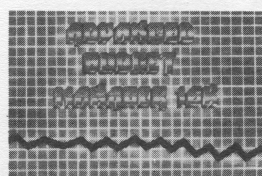
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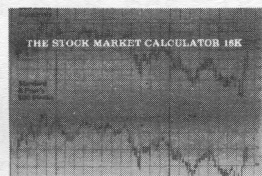
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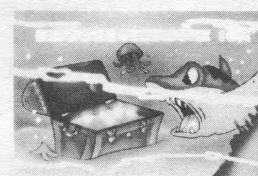
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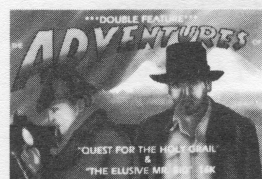
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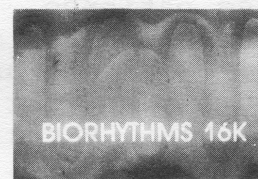
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DEAR EDITOR

I bought and highly recommend the two-tone Keyboard Audio Tone from TV Services of Cambridge LTD, Chesterton Mill, French's Road, Cambridge CB43NP, UK. Keyboard Audio Tone costs \$18, is very well made, compact and easy to install (five solder connections).

I mounted an oversized heat sink on the right of the standard heat sink and it works fine. I also added an on/off switch in the black (ground) lead.

Keyboard Audio Tone tells you when a key is hit, when your ZX/TS accepts it and is ready for more input--very handy on long text lines in SLOW mode. It also signals the beginning and end of SAVE or LOAD, PAUSE and INPUT prompts.

Sidney Linton, Dunwoody, GA

For those readers who want to add a full-sized keyboard, I recommend Double H. Electronics, 195 Lelan, San Antonio, TX 78242.

I bought a keyboard from them two months ago. I installed it with no knowledge of electronics or its complexities. With the aid of Mr. Hornung of Double H., I now have a full keyboard with shift lock, repeat, +, -, *, comma, ;, =, DELETE and EDIT on separate keys.

Double H.'s keyboard (11" x 4") is excellent in quality and has a clean design. All my queries were answered with dispatch, knowledge and patience. Double H. provides service that is uncommon today.

Complete assembled keyboard, with plans for additional circuits is \$46. Parts for additional circuits are \$13.

William Mitchell, Ontario, Canada

I've been trying to program a game that accepts input from two players simultaneously. When I use INKEY\$ function and two keys are depressed at the same time, the

CODE INKEY\$=0. This creates a problem. Is there any way I can get around this using machine language? Maybe a hardware modification would help?

Randy Thompson, Eugene, OR

Write your own ML keyboard scanning routine. Use ROM routines, modifying codes to suit your purposes.

Ian Logan's ROM Disassembly, Part A, details the keyboard scan routine at 02BB as well as other keyhandlers. Briefly, eight half-rows of the keyboard, connected by diodes to address lines A8-A15, see a series of numbers with just 1 bit high. Each key connects 1 address line to 1 KBD line so the processor can get a bit set by column and row of the active key. Eight scans put a number in the HL registers. The monitor decodes characters in a ROM table. No hardware needed.--KO

Is it possible to adapt programs to save on tape so they can be read and run on a Sinclair system in England (and vice versa)?

My brother in England has a ZX81, and we'd like to communicate through them. I understand the problem is in transfer of data to the graphic display because of differences in the number of lines on British television systems. Can it can be overcome?

Wendy Roberts, Cambridge, MA

We bought many tapes in London and they work fine. Unless you use MC to manage the display file yourself, like Quicksilva's Defenders game, you should encounter no problems. If you use PRINT or PLOT to put messages or designs on the screen the differences in TVs are irrelevant.--KO

I recently opened my TS1000 case to install heat sink grease on the voltage regulator to dissipate heat more effectively. In the process,

I unwittingly damaged the keyboard leads; however, I did manage to salvage my computer.

Opening the case of your ZX/TS can be hazardous to your computer. You can damage the keyboard leads with a kink or tear. So when you open the case, first disconnect the leads by gently pulling the flat plastic cable out of its sockets at the PC board front.

If the leads are damaged, you can salvage them if the damage is near the PC board and the conducting strips are exposed on one side of the plastic. Leads are actually longer than required so carefully cut them to just below the damaged section and trim off the excess plastic. Your TS1000 will work as good as new after reinserting the leads into the PC board connectors.

John Reinhardt, Madison, AL

As noted in SYNTAX's Aug.82 review of Memotech's 64K Memopak, the pack causes screen interference when mounted on the computer. The trouble seems to come from a poor ground-bond between the board and its aluminum case.

To solve these problems, I carefully drilled a small hole in the side of the pack to the right of the switch hole then mounted a self-tap screw. I attached a short lead to the screw and soldered it to a ground point on the ZX/TS board and brought it out the expansion hole corner nearest the screw. This change cleared up most screen interference.

Most remaining noise resulted from a poor ground (0V) bond between the modulator box and main board. After resoldering, my display is clean.

Jon Harder, Concord, MA

Much of the problem of poor RAM pack contact with the edge connector seems to result from pried module contacts when you push the

pack on too tightly. Swab both sides of the connector with TV contact cleaner/lubricant and slide the pack on and off several times. Then insert it all the way and back it off about 1/8". (Partial insertion can cause wobble and other bad contact problems.--KO)

Another cause of ZX80 only keyboard lockups (Jan.83 Dear Ed.) is the keyboard membrane over a particular key area may sag slightly from continued use and heat. As long as one key is not breaking contact when released, none of the other keys will work. Sometimes a patch of heavy transparent tape over the troublesome key area will "bridge" the membrane enough to lift it from the contact traces beneath it.

However, if a key doesn't make contact), carefully lift the keyboard membrane and clean both membrane conducting area and contact traces with a Q-tip moistened with alcohol. This works if only one or two keys are involved. If a half-row of keys stops functioning all together, it's usually a sign of a poor solder connection at a keyboard diode or resistor, especially on some of the earlier ZX80 boards.

Robert Hartung, Palmyra, NY

Can I create a user-defined graphic symbol for the ZX/TS? I have done a lot of ML programming lately, but cannot find in the ROM disassembly what part goes to the graphics table for lookup and then causes the 8-byte symbol to print to the screen.

Clement Wehner, Scott AFB, IL

Yes, you can buy sprites by the ROM (try Integrated Data Systems, 11 Brighton Ave., Toronto, Ontario, or dk'tronics, 23 Sussex Rd., Great Yarmouth, Norfolk, UK). Check our big character programs (Jul.82 and 4K modification, Aug.82) to see how to read the ROM character set. --KO

BOOK REVIEW

Title: Computers For Kids--
Sinclair ZX81 Edition
By: Sally Greenwood Larsen
From: Creative Computing Press
39 E. Hanover Ave.
Morris Plains, NJ 07950
800/631-8112, 201/540-0445
Price: \$4.95 (softcover, 64pp.)

Perhaps you justified buying your computer by your children's need for computer literacy in this day and age. This book is a first step toward a child's computer literacy. It offers both incentive and instruction during a child's first few weeks with a ZX/TS. After reading this book with a ZX/TS nearby, he or she is on the way to being a pint-sized programmer.

Computers For Kids--Sinclair ZX81 Edition is valuable as a stand-alone course or a teacher's guide. It proceeds slowly and logically from "What is a Computer?" to computer operation to simple programming techniques.

I couldn't judge whether the text was too ambitious or repetitive for children, so I asked my eight-year old. He worked through the book and reports it "taught me a lot about computers and games and what it can do for you and stuff." (I think he found it entertaining, informative and instructive.) He also pointed out a couple concepts I missed in the manual, showing real understanding of BASIC fundamentals. I was impressed by what this book taught him.

But I feel Larsen spends too much time on computer operation and not enough on programming. She could have more profitably used the sections on operation to reinforce newly acquired programming skills.

Still, if your under-14 children know nothing of BASIC and microcomputers, this book is an important investment.

John Connell, Middletown, RI

DIRECT INPUT HORIZONTAL AND VERTICAL LINE GRAPHICS--8K/1K

Horizontal and Vertical graphics lets you draw lines by direct input and loops so you can draw until you run out of memory.

Line 10, INPUT A\$, selects the type of line you want to draw--horizontal or vertical.

For horizontal lines INPUT A controls the Y-pixel coordinate, INPUT B controls the beginning X coordinate and INPUT C controls the end X coordinate.

For vertical lines, INPUT A controls X-pixel coordinate, INPUT B controls the beginning of the line, and INPUT C controls the end of the line (Y-pixel coordinates).

After you enter the listing, press RUN and "L" appears. Press H or V to select the mode and ENTER. The L cursor appears again--enter coordinates A, B, and C one at a time and your ZX/TS will draw the line. To stop, hit STOP and ENTER twice. Try this example which draws a small rectangle (hit ENTER after each mode and number):

- 1) Select H mode and press 9, 4 and 13. Select H mode again and hit 4, 4, 13.
- 2) Press V for vertical mode and hit 4, 4, and 9. Select V again and hit 13, 4, 9.

Lawrence K. Simmons, Riverside, CA

```
10 INPUT A$
20 IF A$="H" THEN GOTO 50
30 IF A$="V" THEN GOTO 130
40 GOTO 10
50 INPUT A
60 INPUT B
70 INPUT C
80 LET Y=A
90 FOR X=B TO C
100 PLOT X,Y
110 NEXT X
120 GOTO 10
130 INPUT A
140 INPUT B
150 INPUT C
160 LET X=A
170 FOR Y=B TO C
180 PLOT X,Y
190 NEXT Y
200 GOTO 10
SYNTACTIC SUM: 14097, 8K ROM
```

REAL-TIME SOFT CLOCK

You can get a real-time clock through hardware or software. The hardware option, while usually more reliable (especially with battery backup), costs about \$60 with special purpose chips (MSM 5832). Software clocks are cheaper.

Soft Clock creates a software clock from the 3.25 MHz ZX/TS logic clock using the system variable FRAMES at decimal addresses 16436 and 16437. FRAMES tracks the number of pictures sent to your TV (60/second in the US). Soft Clock keeps track of the value of FRAMES.

Soft Clock should be accurate to a few seconds/day. It requires just less than 2K RAM. You can use it as a subroutine in application programs. Just make sure you GOTO 200 at least every five minutes (actually about 8.8). The severe limitations are:

1. You can't turn off your computer, even for a second.
2. You can't use FAST anywhere in your program (FAST resets FRAMES to 65536).
3. You can't use PAUSE.

Line Functions:

Line	Purpose
7	F (fudge factor) corrects for internal clock. Value between 0 and 2 works best.
8	Initializes the count.
100	Looks at current FRAMES.
211	Checks that FRAMES isn't in the middle of a bit manipulation. If it is, ignore the count this time.
220	Resets starting count if FRAMES rolls over from 32768 to 65556.
230	PINC is change in count.
250	SS is value of seconds. Same for MM, HH.
340-74,	600 Pretty up output.
392	Print time at 4,20.
920	Lets you start clock at any time you want.
960	Lets you set time.

P.J. Donnelly III, Centerport, NY

```

1  REM SOFTWARE CLOCK
2  CLEAR
3  LET F=1.605
4  LET OV=32768
5  GOTO 900
100 LET C=PEEK 16436+256*PEEK 1
105 RETURN
120 GOSUB 100
210 LET NV=C
211 IF OV<NV THEN GOTO 215
212 GOTO 220
213 REM
215 IF OV>NV-256 THEN GOTO 200
220 IF OV<NV THEN LET OV=OV+327
500
230 LET PINC=ABS ((OV-NV)+F)
240 LET OV=NV
250 LET SS=SS+PINC/60
260 LET MINC=0
270 IF SS>=60 THEN LET MINC=INT
    (SS/60)
280 LET SS=SS-MINC*60
290 LET MM=MM+MINC
300 LET HC=0
310 IF MM>=60 THEN LET HC=INT (
    MM/60)
320 LET MM=MM-HC*60
330 LET HH=HH+HC
340 IF HH>24 THEN LET HH=HH-24
370 IF HH<10 THEN LET H$="0"
372 IF MM<10 THEN LET M$="0"
374 IF SS<10 THEN LET Z$="0"
390 LET SS1=INT SS
391 PRINT AT 2,20;" "
392 PRINT AT 4,20;H$+STR$ HH+"":
"+M$+STR$ MM+"": "+Z$+STR$ SS1
410 GOSUB 600
499 GOTO 200
600 LET H$=""
602 LET M$=""
604 LET Z$=""
607 RETURN
900 PRINT "          SOFT CLOCK  "
901 LET PINC=0
905 PRINT ""
920 PRINT "SET TIME (S) OR STAR
T AT 0 (Z)"
930 INPUT S$
935 CLS
940 IF S$="Z" THEN GOTO 950
942 IF S$="S" THEN GOTO 960
944 GOTO 930
950 LET SS=-4
952 LET MM=0
954 LET HH=0
956 PAUSE 0
958 GOTO 200
960 CLS
961 PRINT "ENTER TIME AS HH:MM:
SS"
962 LET PINC=0
963 INPUT T$
965 IF LEN T$<>8 THEN GOTO 963
966 LET MINC=0
967 LET HH=VAL T$(1 TO 2)
968 LET MM=VAL T$(4 TO 5)
969 LET SS=VAL T$(7 TO 8)
971 PRINT "IS THIS RIGHT? ";HH;
";MM;";";SS
973 INPUT S$
974 PAUSE 0
975 CLS
976 IF S$<>"Y" OR S$<>"YES" THE
N GOTO 200
978 GOTO 961
SYNTACTIC SUM: 15979, 8K ROM

```

GET YOUR SYSTEM TOGETHER

Your ZX/TS is compact but can give you that "all over the place" feeling with snarled cables, loose RAM pack problems, and instability.

One easy, but expensive, cure is an encased keyboard that holds your ZX board inside.

This cheaper way doesn't take much time and uses materials you may already have:

- 1) 10" x 16" shelving, 3/4" thick.
- 2) Double-stick transparent tape.
- 3) Four-inch foam mounting tape.
- 4) Adhesive-backed felt.
- 5) Rubber selfstick 1/2" squares.
- 6) Neon nightlight, 1/4 watt.
- 7) Extension cord (in-line switch).

Raise your ZX/TS with four new feet to make it more stable when typing. This also raises your RAM pack, reducing risk of crashes when typing shifted characters.

Next, place your ZX/TS with RAM, printer and power pack on the board in a pleasing and simple layout. Coil up the 9V DC cord and leave just enough to reach your ZX case. You can turn your ZX/TS on and off with the AC cord switch.

Check your system layout for convenience and find the shortest wire length for each connection. Use foam tape to mount the power pack with its prongs to the back so you can bring the extension to it easily. Plug the night light into the end and use a side connection as the AC supply to the pack. When the power is on, the light is on.

Pass the cables under your computer to neaten up your system's layout. Put double-stick tape on each new rubber foot and position your ZX/TS where you want it--press firmly until secure. Mount your printer the same way.

One more plus: a 10" x 16" board fits inside many attache cases, so you can travel with your whole system. A few bucks gives your ZX/TS dignity.

Jon Harder, Concord, MA

SOFTWARE REVIEW

Program: Snake

Price: \$9.95 plus \$2.50 P&H

ROM/RAM required: 8K/16K

Printed listings? No

Program listable? Yes

Written in: BASIC and MC

Challenge: Great

Display: Good

From: ZETA Software, POB 3522

Greenville, SC 29608

You are a snake in this game trying to maneuver inside a barn and eat mice that randomly pop out of holes. This would be easy if you didn't have to worry about your length increasing with every mouse you eat. The game ends when you touch the barn walls, cross your own path, or eat 100 mice.

Snake comes well packaged on tape with instructions and two sets of stick-on labels for the direction keys. Snake loads easily and runs automatically.

Two user-selectable variables give Snake thousands of game combinations, although most are senseless as the instructions warn. These two variables are the snake's speed and length of time the mice freeze when they pop out of their holes. The score, which increments with every mouse you eat, is continuously displayed at the bottom of the screen.

My only complaint about Snake is the top display line is slanted. I think this is because the display is generated by machine code. This line does not affect game play and adjusting horizontal hold control on the TV helps. (Jon Bobst of ZETA says the slanted line could be due to a MC generated display, the TV or hardware used--Ed.)

Snake provides many hours of recreation and becomes a challenge trying to beat your last score. It's also compatible with all ZX/TS 8K ROM machines.

John Impellizzeri, Sterling Hts, MI

DO OR DIE--8K/16K

You are trapped in a Mayan maze-like tomb. A block pixel in the central chamber is the only escape route. Use arrow keys 5,6,7 and 8 to move but watch for trap doors that send you back to the starting point. An hourglass timer along the right side of screen relentlessly spills away, starting with the first move, so keep going. Breaking walls or enlarging doors disqualifies you.

Use a larger value in line 110 to increase your game time. Press RUN to start and BREAK to exit.

Tom Shields, Franklin, NC

```

2 REM LINE 110 CONTROLS TIME
5 REM "S" SAVES "DO OR DIE"
10 REM L310,L320 SET "TRAPS"
15 FAST
20 GOTO 2000
50 SLOW
55 PAUSE 500
60 IF INKEY$="S" THEN SAVE "DO
OR DIE"
70 PAUSE 40000
    
```

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```

105 LET T=0
110 LET L=15
120 LET Z=0
125 LET X=2
130 LET Y=2
135 PLOT X,Y
136 PLOT X,Y
140 UNPLOT X,Y
150 IF INKEY$="5" THEN LET X=X-
1
160 IF INKEY$="6" THEN LET Y=Y-
1
170 IF INKEY$="7" THEN LET Y=Y+
1
180 IF INKEY$="8" THEN LET X=X+
1
190 LET Z=Z+1
310 IF X=26 AND Y=4 OR X=26 AND
Y=12 OR X=26 AND Y=27 OR X=26 A
ND Y=35 THEN GOTO 120
320 IF X=8 AND Y=22 OR X=12 AND
Y=22 OR X=44 AND Y=22 OR X=48 A
ND Y=22 THEN GOTO 120
350 IF Z=L THEN PRINT AT T,31;"
355 IF Z=L THEN LET T=T+1
360 IF Z=L THEN LET Z=0
370 IF T=22 THEN GOTO 5050
375 IF X=32 AND Y=18 THEN GOTO
5100
500 GOTO 135
1175 LET A=A+4
1180 LET B=B-4
1185 LET C=C-4
1200 GOTO 2050
2000 LET A=0
2010 LET B=56
2020 LET C=43
2050 FOR X=A TO B
2060 PLOT X,A
2070 NEXT X
2500 FOR Y=A TO C
2510 PLOT B,Y
2520 NEXT Y
2700 FOR X=B TO A STEP -1
2710 PLOT X,C
2720 NEXT X
2800 FOR Y=C TO A STEP -1
2810 PLOT A,Y
2820 NEXT Y
2825 IF A=16 THEN GOTO 3680
2850 GOTO 1175
3680 LET X=26
3700 FOR Y=4 TO 16 STEP 4
3710 FOR O=27 TO 39 STEP 4
3715 UNPLOT X,O
3720 UNPLOT X,Y
3725 NEXT O
3730 NEXT Y
3805 LET Y=22
3810 FOR X=4 TO 52 STEP 4
3815 UNPLOT X,Y
3820 NEXT X
4000 FOR I=0 TO 21
4040 PRINT AT I,31;"*"
4045 NEXT I
4050 PRINT AT 10,10;" DO NOW";AT
11,10;" OR DIE"
4070 PLOT 32,18
4075 PLOT 2,2
5000 GOTO 50
5050 PRINT AT 10,10;"YOU DIE";AT
11,10;"
5055 STOP
5100 IF T<11 THEN GOTO 5050
5110 PRINT AT 10,10;"YOU WIN";AT
11,10;"
SYNTACTIC SUM: 29469, 8K ROM
    
```

REVERSE VIDEO MONITOR DRIVER

This circuit, using the concept published in *Electronics* (6 Oct.82 p.113), drives a video monitor and reverses video on demand. You can get all parts except 74LS266 chips at Radio Shack. Many parts stores carry 74LS266s--we paid \$0.60 each.

Caution: SYNTAX considers this circuit developmental. It may need adjustment or design change to work with a specific computer and components. Use it as a place to start.

With one chip, one 2N3904 and 10 discrete components, the circuit offers a simple, low-performance solution. Just connect video, +5V (30 mA drain) and 0V to your ZX/TS to drive a Zenith ZVM-121 monitor.

Build this device on a small experimenter board. Keep the wires short and use coaxial cable for the video connections. Lay the 2N3904 flat against the board, insulate the circuit, and fit it under the ZX/TS PC board. Or make 5V from

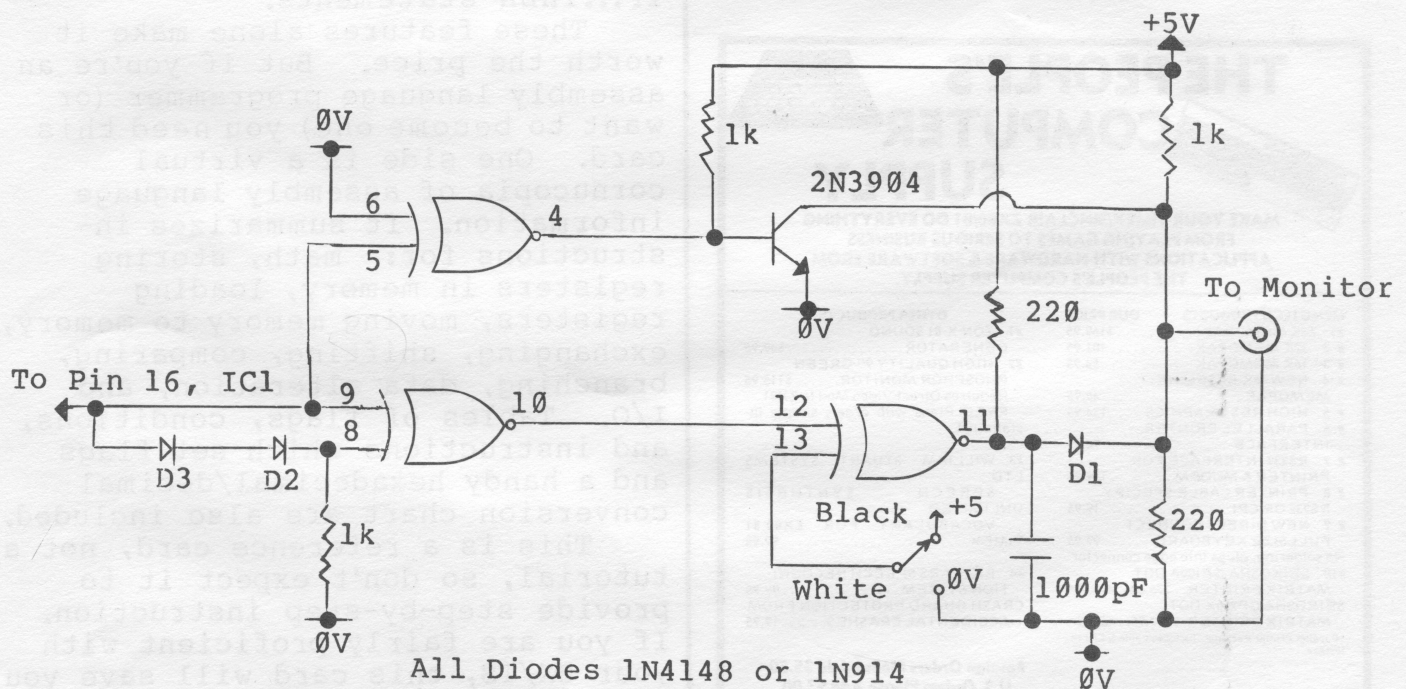
the monitor's 12.7V supply and put the circuit inside that case.

Standard video signals switch between 3 signal levels: white and black (video) and sync (blacker-than-black). Usually, picture signals rest at black, drop regularly to sync level, and rise to white. ZX/TS video rests at white, drops regularly to sync and dips to black to create character dots.

We must separate the sync from the video pulses, standardize the video to switch between black and white levels, and make sync pulses flip from video to sync levels.

We use LS exclusive NOR (A OR B AND NOT BOTH) gates. LS chips take voltages above 2 volts as logic highs and voltages below 0.7 volts as lows. If both inputs are +5V or both are 0V, output is high (+5V). Leaving an input open or tying it to +5 gives equal logical results.

So when the ZX/TS signal drops from white to black, the gate does not respond, while white to sync



All Diodes 1N4148 or 1N914

0V to Pins 6, 7

5V to Pin 14

IC1 74LS266

transitions change the gate output state. In our circuit, pin 5 takes composite video input and compares it to 0V on pin 6. Pin 4 responds by being at +5 for sync inputs and 0V for video. We obtain combined horizontal and vertical sync at pin 4, but with levels reversed; we correct these with the 2N3904.

Pin 9 also gets the combined signal, but compares it to a lower voltage signal that stays <0.7V at ZX/TS black level, but goes high at the white level. Both inputs are low at ZX/TS sync level. These inputs differ only during the black level, so pin 10 follows video.

Pin 13 gets a reference signal of +5 or 0V to choose the voltage at pin 12 which will cause a high voltage at pin 11 (video output).

Output resistors and diodes create a new composite video signal. When pin 4 goes to +5V, the 2N3904 brings the output to zero--the sync level. When pin 4 is at 0V, pin 11 controls the output between black and white levels.--KO

SOFTWARE REVIEW

Product: Reference Card for the ZX80, ZX81 and Timex Sinclair 1000
 From: Nanos Systems Corp.
 P.O. Box 24344
 Speedway, IN 46224
 Price: \$5.95

"This card has it all!" exclaims Nanos System's advertising. And indeed it does. Reference Card for ZX80, ZX81 and TS1000 comes in a handy 3 3/4" x 8 1/2", 20 panel, accordion-fold format. The card is packed with information such as brief descriptions of the BASIC statements, commands, operators, and functions.

Among its many tables and charts Reference Card also has: screen layout, character codes in decimal and hexadecimal, error codes, memory maps for the ZX80, ZX81 and TS1000, and selected ZX81 ROM calls. Reference Card even has tips on how to use FOR...NEXT and IF...THEN statements.

These features alone make it worth the price. But if you're an assembly language programmer (or want to become one) you need this card. One side is a virtual cornucopia of assembly language information. It summarizes instructions for: math, storing registers in memory, loading registers, moving memory to memory, exchanging, shifting, comparing, branching, data alteration, and I/O. Tables of flags, conditions, and instructions which set flags and a handy hexadecimal/decimal conversion chart are also included.

This is a reference card, not a tutorial, so don't expect it to provide step-by-step instruction. If you are fairly proficient with your ZX/TS, this card will save you the time and energy it takes to thumb through manuals--you won't want to be without it.

James Conrad, Seattle, WA

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ROUTINE ELIMINATION--8K/1K

Machine Language programs often use BASIC routines to load REM lines with ML code. If you PEEK the code from the REM line and POKE into protected memory for running, you can eliminate the loading routine by writing the REM line in hex equivalents to ML decimal codes.

You have to initialize REM lines to use in the loading routine anyway, so why not just write it in hex and skip the routine and all its decimal inputs? Published routines usually list the hex with the ML program, but if not, you can get it in the Appendix of the ZX81 or TS1000 manual.

This example uses the 8K Syntactic Sum decimal listing (Jun.83) converted to hex.

Before typing or loading the program, regardless of memory, POKE 16388, 225
POKE 16389, PEEK 16389-1 and NEW to reserve memory space for the ML routine. The 225 in the POKE is derived by subtracting 1/2 the number of characters (31) from 256.

Now enter the listing as shown. Type SAVE, RUN and write down the displayed value. Then PRINT USR the value to get Syntactic Sum. (In line 4, 16574 comes from adding the number of characters in the REM line (62) less 2 to 16514.)

Line 2 gets the first address of reserved memory, which will be the starting address of the ML routine. Line 5 PEEKS hex from the REM line, converts it to decimal, and POKES it to reserved memory.

Rolf Miller, Ventura, CA

```
1 REM 217D40ED5B0C40DD2100007
CBA20087DBB2004DDE5C1C94E0600DD0
92318EC
2 LET A=PEEK 16388+PEEK 16389
*256
3 PRINT A
4 FOR X=16514 TO 16574 STEP 2
5 POKE A,(PEEK X-28)*16+PEEK
(X+1)-28
6 LET A=A+1
7 NEXT X
SYNTACTIC SUM: 11175, 8K ROM
```

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